



OTTOSON MIDDLE SCHOOL
STUDY FOR ADDITION
ARLINGTON, MA

APRIL 25, 2016



HMFH ARCHITECTS

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McPhail Associates, LLC Geotechnical Engineer

Introduction

The Ottoson Middle School is located at 63 Acton Street on a 7.15-acre parcel of land. It is located in a residential neighborhood, adjacent to Town-owned woods (Cusher Lot) and St. Athanasius Greek Orthodox Church. The school is accessed from both Acton Street and Appleton Place. The building was originally constructed in 1921 and expanded in 1996 and is approximately 154,380 square feet in total. The school currently accommodates just over 1,100 students in grades six through eight. The building is constructed into the hillside, with the main entry and parking lot off of Acton Street and a second parking lot and play field accessed from Appleton Place. There is a 52-foot grade change from one side of the property to the other. There are four occupied floor levels (one of which is double-story), the upper parking accommodates 51 cars (3 of which are accessible spaces) and the lower parking lot accommodates 25 cars for a total of 76 parking spaces on site.

The middle school is currently crowded and its student population is projected to increase. The intent of this study is to define an educational program for an addition to Ottoson, develop addition floor plan diagrams, review the existing building condition and identify code and program-related renovation scope of the existing school. This report includes floor plan diagrams and scope narratives used together by a cost estimator to develop a study-level cost estimate.

Educational Program

The proposed addition accommodates the core academic spaces for the sixth grade population (a maximum of 500 students). The proposed space program and layout was developed with the School Administration and for this study purpose includes four academic pods, specialist spaces, break out areas, and support spaces. Refer to **Appendix A** for the Addition Space Program and **Appendix B** for the Addition Floor Plan diagrams.

Addition Architectural Scope

Two addition options were initially developed, one located on the upper parking lot (off Acton Street) and the other on the sports field near Appleton Place. In both, the addition proposed is approximately 40,000 square feet, mostly on two floors with a partial lower floor level for vertical circulation and mechanical space. In both instances the lowest academic floor level is located a floor (or more) above grade to allow for, in the case of the upper lot, parking and the bus drop-off loop to be maintained, and in the case of the Appleton Place location, to align the addition with an occupied floor of the existing school to create the required physical connection. In the instance of the Appleton Place Addition, the raised building would allow for a multipurpose, alternative PE space and increased parking (17 additional spaces) underneath in lieu of the sports field currently in this location.

After thoughtful review by the School Building Task Force it was deemed best to focus the study on one option, the one located on the Appleton Place side of the building. The reasons cited to eliminate the upper parking lot location option from consideration were:

- it encroaches on the upper ballfield, which is not school property
- it needs to be two-plus stories high above the ground to accommodate buses and to meet an existing floor level
- it would require demolishing and rebuilding an existing stair to allow for an accessible connection
- it would create a long and convoluted walking route for a student to reach the three main shared use spaces (Gym, Library, and Cafeteria) in the existing building

Addition Floor Plan diagrams are located in **Appendix B** along with a Building Section diagram showing the top floor of the addition connecting to the lowest level of the existing school at two locations to either side of the Blue Gym. The addition needs to be constructed a minimum of 30'-0" away from the existing building, which places the addition near the property line.

The proposed addition requires lowering the grade by approximately 4'-0" so it is in line with Appleton Street, increasing the need for retaining walls between the existing building and the new addition. The existing parking lot is to be regraded to align with the new, and it is likely that either a low retaining wall along the existing parking lot area or full regrading of the sloped earth is required. Refer to **Appendix C** for the Structural Narrative. All other scope for the addition is presumed (and estimated) to be in line with new construction practices and similar to the recently constructed school in Town.

Renovation Architectural Scope

Educational Program-Related:

In order to accommodate the anticipated increased enrollment, the shared use program spaces within the existing Ottoson building were assessed to determine if they are large enough and/or that there are enough program spaces available for teaching and learning to occur for the nearly 1,500 projected students. Working with the School Administration, it is determined that the following spaces need to be enlarged:

-Cafeteria – remove the wall between the Cafeteria and the adjacent Music Classroom to enlarge the Cafeteria by 1,250 square feet, increasing the total Cafeteria (not including the entry and serving line area) to approximately 5,700 square feet. At this size, four (4) lunch periods are required to serve the student population. Note: existing deteriorating handrails are to be replaced.

-Library – removal of some if not all of the interior partitions to either side of the library, thereby extending not only the circulation but the whole Library space from corridor to corridor to create a Library of approximately 8,500 square feet. (For reference, MSBA (Massachusetts School Building Authority) Guidelines would recommend a 9,000-square foot Library for this size student population). Revisions to the lighting and power/data layouts, and new carpeting are required.

In this Study the addition is assumed to be for the sixth grade population and the seventh and eighth grades are to remain in the existing school. Each grade requires four academic pods, each made up of three general Classrooms and one Science Classroom. The following shared use program spaces are required:

- 3 Music Classrooms
- 3 Art Classrooms
- 3 Technology Classrooms
- 3 Family & Consumer Science Classrooms
- 7 World Language Classrooms
- 2 Computer Classrooms

There are many other specialist and support spaces that may stay in their current location and others that relocate to newly vacated spaces. These spaces include: teacher workrooms, offices, specialist spaces, conference rooms, transition rooms, METCO, LABBB, in-house suspension, administration, guidance, and nurse.

Renovation scope required to create the following program spaces:

- 1 Music Classroom: remove walls, revise lighting layout
- 1 Art Classroom: add sinks and casework
- 2 Science Classrooms: add sinks, casework, fume hood, eyewash/shower station, and utility connections
- 2 Computer Classrooms: add power/data connections

Refer to **Appendix D** for floor plan Renovation Diagrams identifying a proposed program layout and reconfiguration for Ottoson.

As proposed, the addition with an accessible entry, toilet facilities, and circulation, is considered a separate building from the existing school and therefore no access-related renovations are required in the existing school.

Other:

The operable walls in the Blue Gymnasium do not function properly. Having functioning operable walls allow for simultaneous use of the Gym and therefore supports scheduling and multi-purpose activities. The renovation estimate includes two new operable walls at the Blue Gym.

Conclusion

A feasibility study level estimate developed from the information and scope provided in this report is included in **Appendix E**. The construction cost equals \$19.0 million, applying a 20% factor for soft costs (design, investigation, testing, etc.), the estimated total project cost is \$22.8 million.

Appendix A

Space Program

Addition Space Program

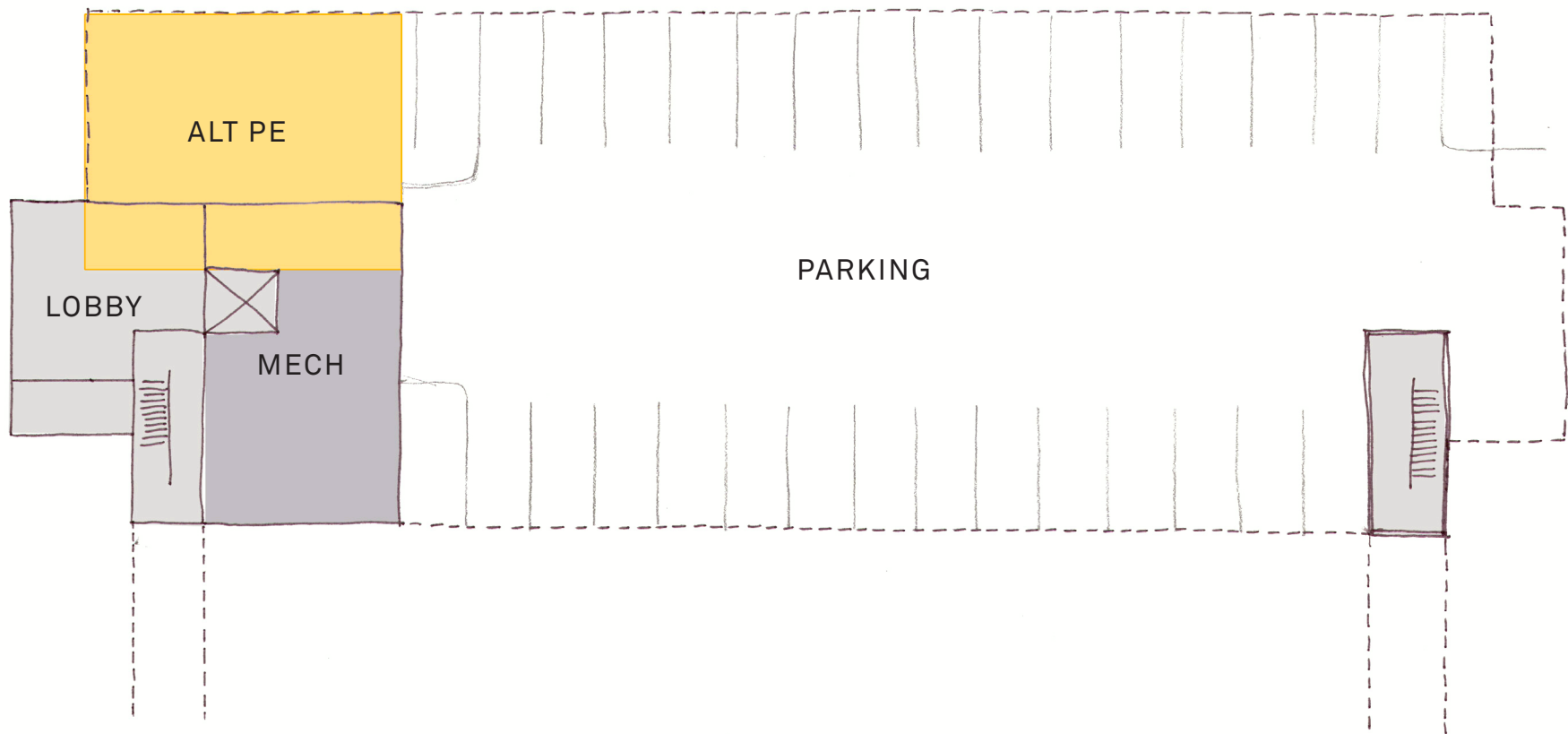
Room Type	SF	# of Rms	Area Notes
General Classroom	850	12	10,200
Science Classroom	1,300	4	5,200
Break out	540	4	2,160
ELL	850	1	850
Specialist Room	1,060	2	2,120
Specialist Room	850	1	850
Specialist Room/Small Group	190	4	760
Multipurpose Room/ Alt PE	2,000	1	2,000
Administration/Nurse	850	1	850
Guidance/Social Worker	850	1	850
Teacher Workroom	190	2	380
Building Storage	100	4	400
TOTAL NET SQUARE FEET			26,620
Net-to-Gross Factor			1.49
TOTAL GROSS SQUARE FEET			<u>39,580</u>

Appendix B

Floor Plan Diagrams &
Building Section

OTTOSON SCHOOL
PARKING LEVEL

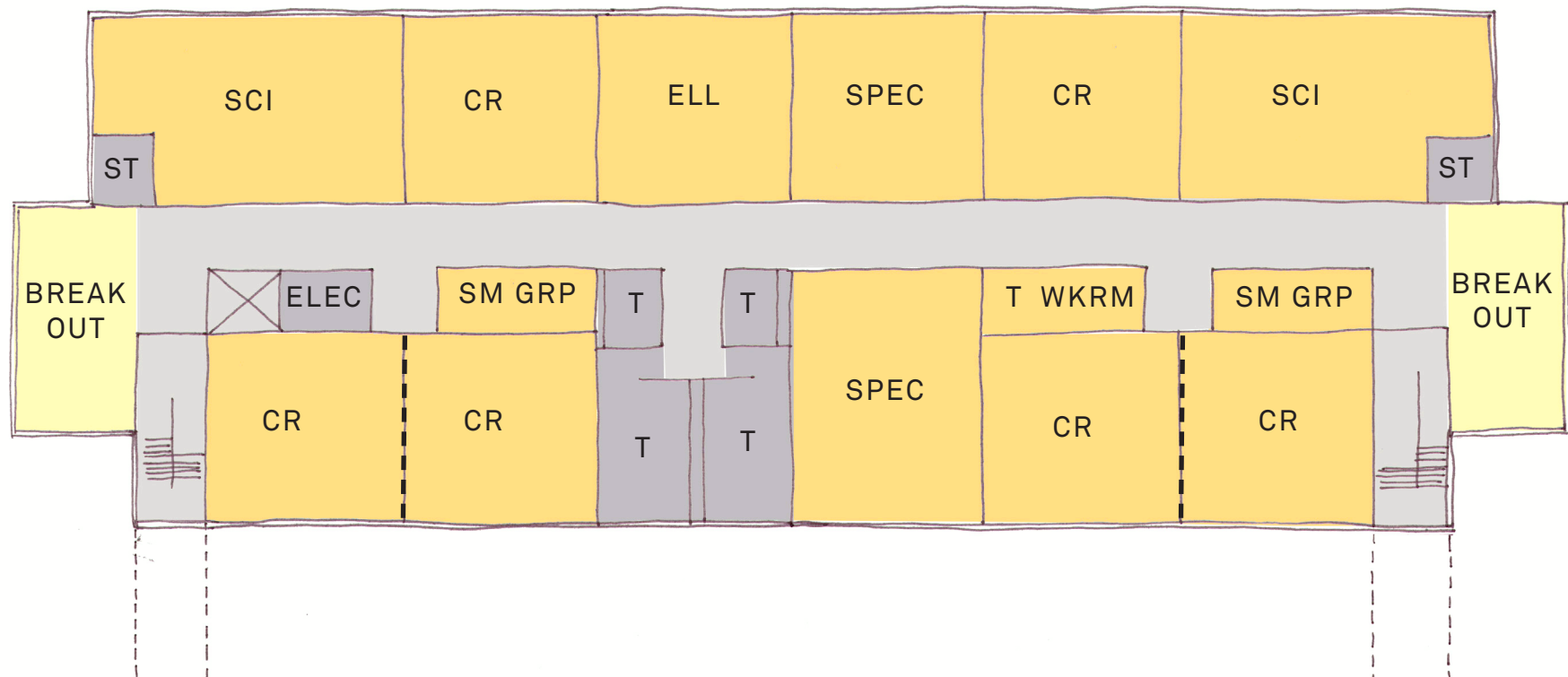
HM
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OTTOSON SCHOOL
FIRST FLOOR



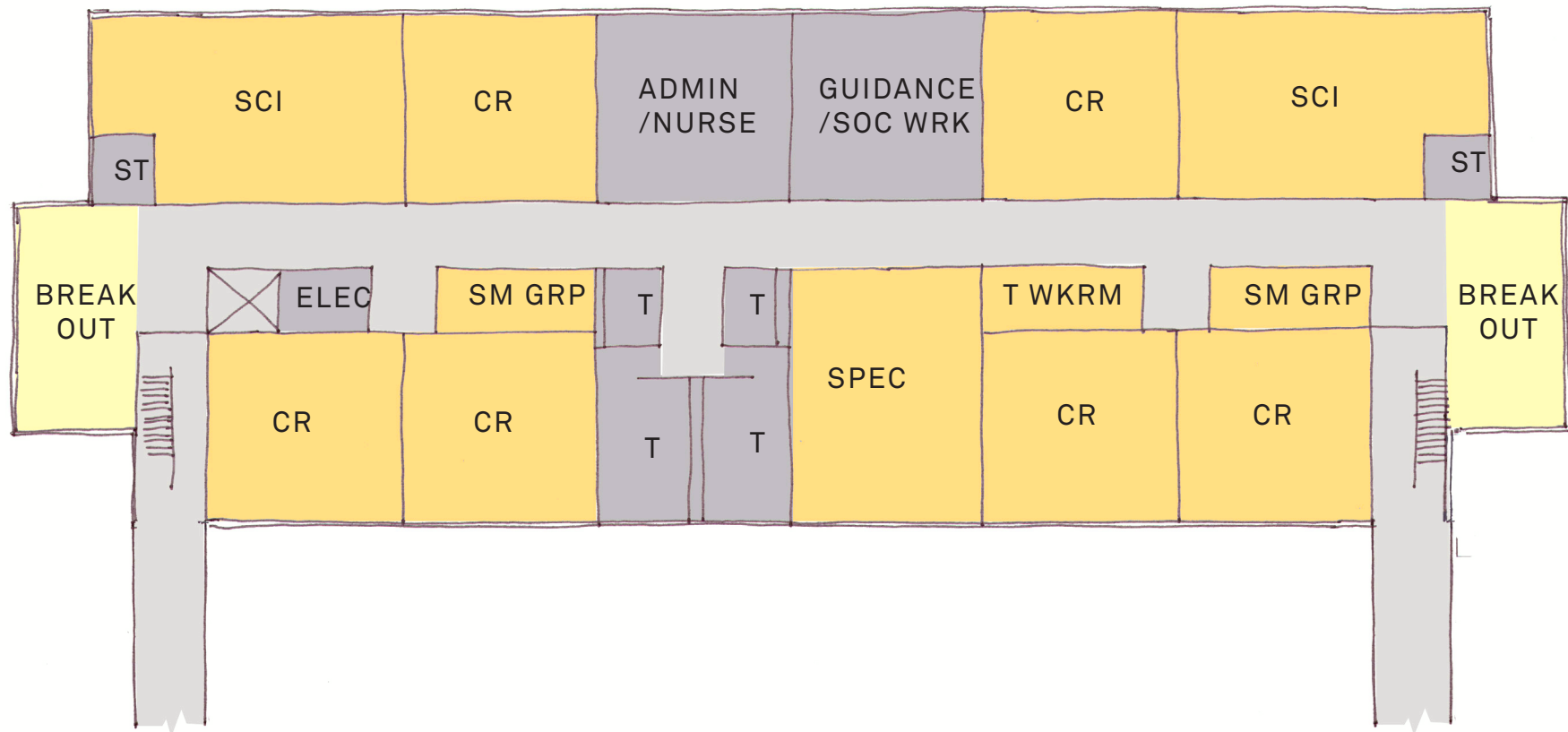
HM
FH



OTTOSON SCHOOL
SECOND FLOOR



HM
FH



OTTOSON SCHOOL
GROUND/PARKING LEVEL



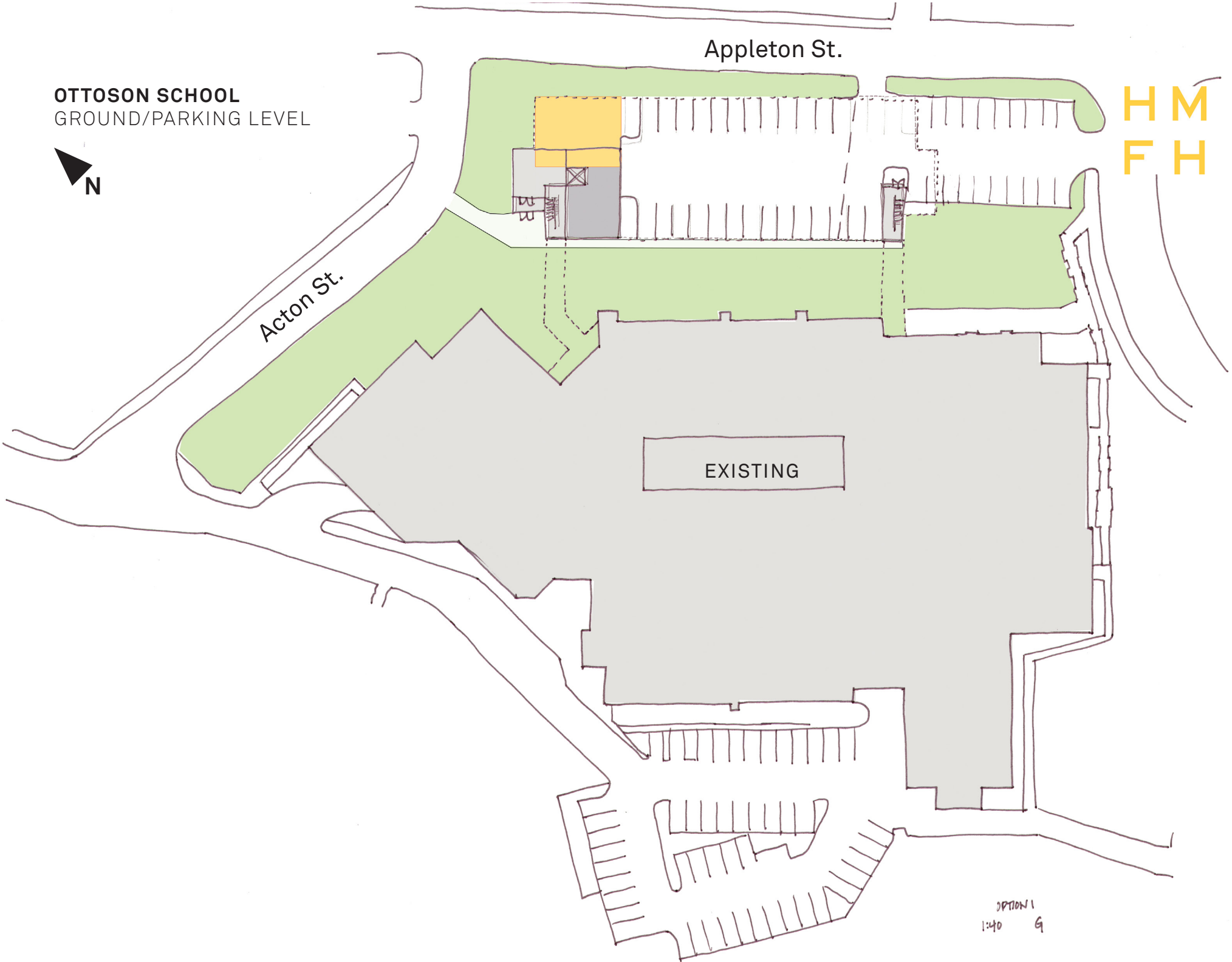
Appleton St.

HM
FH

Acton St.

EXISTING

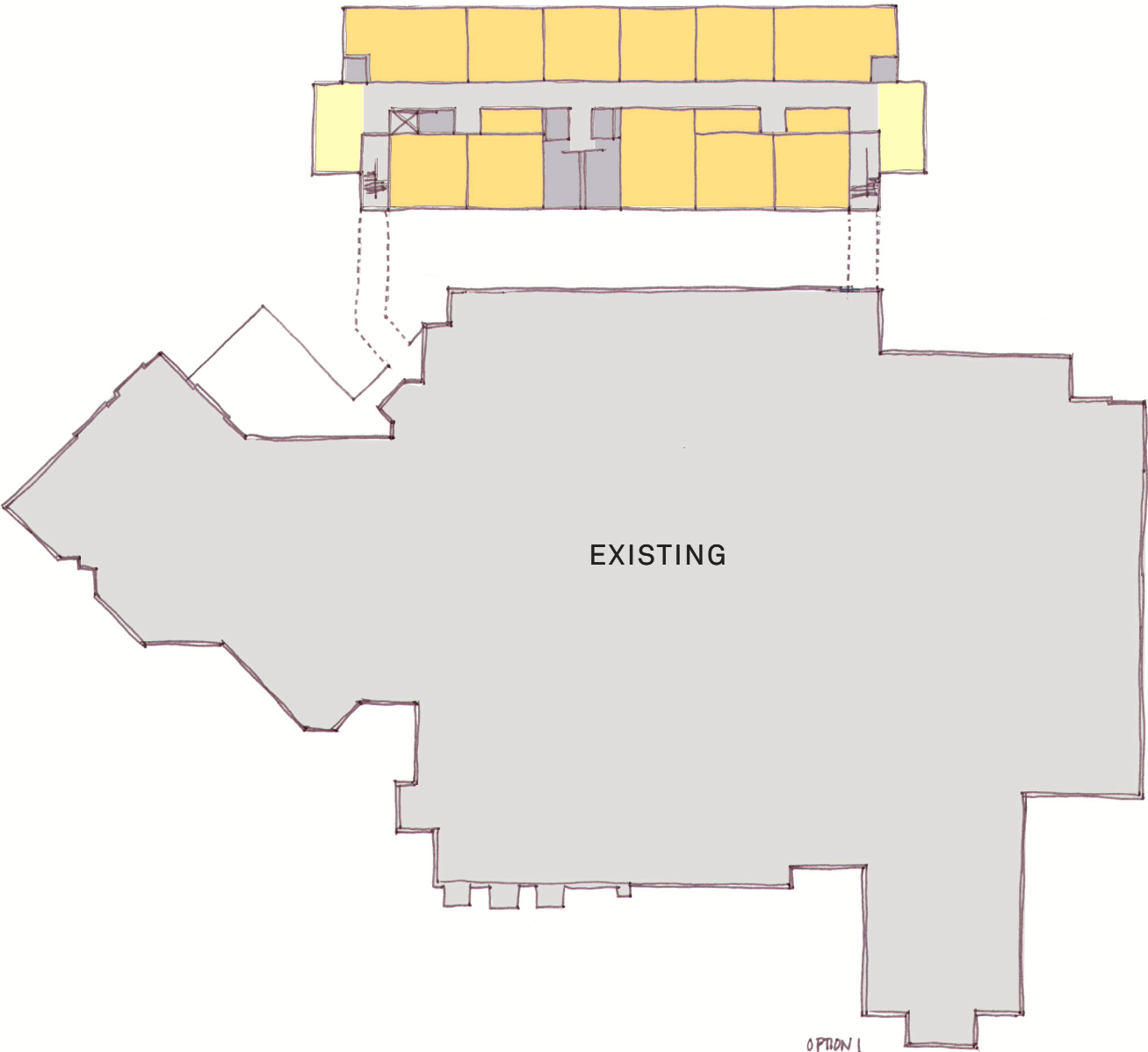
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OTTOSON SCHOOL
FIRST FLOOR



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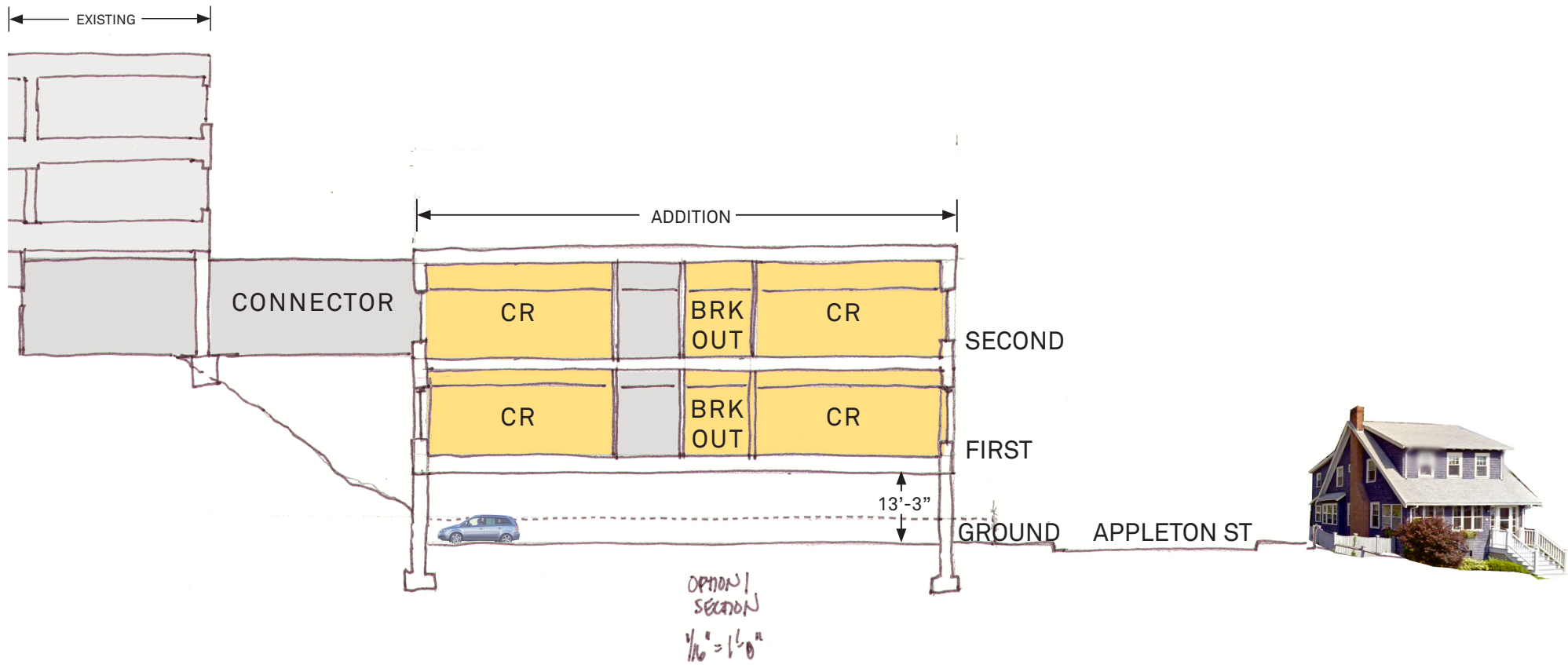
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OTTOSON SCHOOL
SECOND FLOOR



OTTOSON SCHOOL
SECTION

HM
FH



Appendix C

Addition Study –
Structural Narrative

OTTOSON MIDDLE SCHOOL ADDITION STUDY Arlington, Massachusetts

Structural Narrative April 7, 2016

INTRODUCTION

Foley Buhl Roberts & Associates, Inc. (FBRA) is collaborating with *HMFH Architects, Inc. (HMFH)* and their consultants in the study of a potential addition to the Ottoson Middle School in Arlington, MA. The purpose of this narrative is to summarize the basis of the structural design, describe the primary structural systems of the potential, new addition and provide preliminary structural quantities for cost estimating purposes. Outline Structural Specification sections have also been included. The new addition would be designed and constructed under the provisions of the Massachusetts State Building Code (780 CMR – Eighth Edition).

I. GENERAL DESCRIPTION

The Ottoson Middle School, located at 63 Acton Street in Arlington, is a three-story building, constructed on a sloping site (downwards southwest to northeast). The potential, two-story (plus a Parking Level), flat roof addition would be constructed on the northeast (back) side of the existing building on a level playing field area located on Appleton Place.

Program elements for the addition would include a surface Parking Level (Elevation 146.25' +/-), serviced by two stairways and an elevator. An Entry Lobby and a small Mechanical Room would also be located at this level. Classrooms with Breakout Areas would be located at the First Floor (Elevation 150.25' +/-); Classrooms, Breakout Areas and Admin/Nurse/Guidance Offices would be located at the Second Floor (Elevation 174.25' +/-). The total floor area of the addition is approximately 40,000 square feet (gross; excluding parking areas), with a building footprint of approximately 17,600 square feet. Two, one-story, elevated walkway/bridges will be constructed at the east and west ends of the addition (stair locations), linking the Second Floor of the addition to the lowest level of the existing building (Elevation 174.25' +/-).

The addition would be steel framed, for reasons of economy, performance, flexibility, and speed of construction. Typical floor construction would be a concrete slab on composite steel deck, supported by composite, structural wide flange steel beams and girders. Shear studs would be field welded to the beam/girder flanges to achieve composite action with the floor slab. Typical flat roof areas would be framed with steel roof deck supported by structural steel beams and girders. A concrete slab on composite steel floor deck would be provided at rooftop equipment areas (for acoustic purposes).

Typical columns would be rectangular hollow steel tube (HSS) sections. Lateral stability for wind and seismic loads would be provided by steel bracing in each direction at each level (including the Parking Level as well). Structural bays would be approximately 30 feet square.

The new, steel framed construction would be classified as Type IIB (Noncombustible, Unprotected); floor and roof construction would not require fire protection. Typical, non-exposed floor and roof steel framing would be surface prepped and be left unprimed. Structural steel exposed to view in the finished work (limited areas; potentially the Entry Lobby) would be classified as Exposed to View Structural Steel (E.V.S.S.) and would be shop primed with primer compatible with the finish paint.

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No subsurface soils information was available; however, based on recent discussions with the Geotechnical Engineer (McPhail Associates, LLC) rock is present at the site. Foundations for the 1996 addition (adjacent to the potential new addition) consist of caissons bearing on rock at Elevation 140.0' +/- . It is expected that the top of rock elevation slopes downwards towards Appleton Place and will not impact the foundation construction of the addition. Accordingly, foundations are expected to be conventional, shallow spread footing construction; typically bearing on undisturbed natural soils overlying the rock. The current grade at the addition site is Elevation 150.0' +/- , which is approximately 4 feet above Appleton Place. The existing fill in this area will need to be removed to accommodate the Parking Level and the building foundations, which will be located at Elevation 42.0' +/- . Parking Level construction will be a bituminous concrete slab. A conventional concrete slab on grade, underlain by a polyethylene vapor barrier and rigid insulation on a compacted slab base fill, will be constructed in the occupied areas at this Level (Entry Lobby, Mechanical Room, Stairwells, etc.). Existing utilities, if present within the addition footprint, will be removed and relocated to accommodate the new construction.

Exterior wall construction will be a mixture of glazing and steel stud cavity wall construction with a masonry veneer. Galvanized steel loose lintels will be provided at the heads of typical, punched window openings in the masonry veneer. Galvanized relieving angles will be required at larger and/or multiple, minimally separated window openings, and at locations where the height of masonry exceeds 30 feet.

II. BASIS OF STRUCTURAL DESIGN

Codes and Design Standards

<i>Building Code:</i>	Massachusetts State Building Code (780 CMR) – 8 th Edition.
<i>Materials:</i>	ASTM; applicable standards
<i>Concrete:</i>	ACI 318 and ACI 301; latest editions.
<i>Structural Steel:</i>	AISC “Specification for Structural Steel Buildings” and AISC “Code of Standard Practice”; latest editions.
<i>Steel Deck:</i>	Steel Deck Institute (SDI) – Referenced Standards.

Design Loads/Parameters

Live Loads:

Classrooms (with partition allowance):	70 PSF
Corridors (Second Floor):	80 PSF
Open Plan Areas:	100 PSF
Stairs:	100 PSF
Mechanical Areas:	150 PSF

Snow Loads (Arlington):

Basic Ground Snow Load:	40 PSF
Minimum Flat Roof Snow Load:	30 PSF

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Future Photovoltaic Panel (PV) Loads:

Flat Roof: 10 PSF

Wind Loads (Arlington):

Wind Speed: 105 MPH

Seismic Parameters (Arlington):

Spectral Response – Short Periods:	$S_S = 0.290g$
Spectral Response – 1-Second Periods:	$S_D = 0.069g$
Seismic Use Group:	III
Seismic Design Category:	B
Site Class:	C (Assumed)
Structural System:	Building Frame System
Lateral Load Resisting System:	Steel Braced Frames (Not Specifically Detailed for Seismic Resistance)
Response Modification Factor (R):	3.0
System Overstrength Factor (Ω_o):	3.0
Deflection Amplification Factor (C_d):	3.0

Foundations:

The preliminary foundation design is based on an assumed allowable bearing capacity of 4.0 kips per square foot (2.0 tons per square foot) on undisturbed natural soils or on compacted structural fill (to be confirmed). All fill and unsuitable soils (fill, organics and loose silts, if present) will be removed and replaced with compacted structural fill, prior to constructing the foundations and the slab on grade.

Construction Classification:

New construction will be Type IIB Construction (Noncombustible, Unprotected). Floor and roof construction will typically not require applied fireproofing, except those members supporting rated enclosures. The addition will be fully sprinklered.

Sustainable Design Considerations:

Sustainable design considerations will be incorporated in the building design; the new addition will be designed and constructed in accordance with LEED (Silver) standards.

III. STRUCTURAL SYSTEMS DESCRIPTION

A. SUBSTRUCTURE

A10: Foundations

Foundations for the addition will consist of individual spread footings (at columns) and continuous strip footings (at walls). All foundation walls and footings will be cast-in-place, reinforced concrete. The preliminary foundation design is based on 4.0 kips per square foot (2.0 TSF) on undisturbed natural soils or on structural fill.

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Prior to placing footings or compacted structural fill, all unsuitable soils will be removed and the natural soil layer will be proof-rolled. Any soft/unsuitable areas will be removed and replaced by compacted structural fill. If subgrades become wet, unstable, and/or difficult to proof-roll, a layer of crushed stone, underlain by a geotextile separation fabric, may be necessary. Following footing excavation, provide a 4" thick layer of $\frac{3}{4}$ " crushed stone to protect the subgrade.

Due to the existing site topography, a reinforced concrete retaining wall will be required along the south (back) side of the addition, returning around the corners on the east and west ends. The existing (stepped) retaining walls to the north of the 1996 addition will be removed and a temporary lateral earth retention system (e.g. soldier piles and lagging) will be installed to facilitate the construction of the foundations. Landscaping between the addition and the existing building will need to be restored after construction is completed.

Temporary dewatering may be required during construction.

It is not expected that rock will be encountered during foundation or utility excavation.

A perimeter foundation drain will be required along the south (back) wall of the addition. Underslab drainage will be installed below the occupied areas of the Parking Level.

A1010 – Standard Foundations

- Typical perimeter frost wall: *14" thick with an 8" wide masonry shelf with horizontal and vertical reinforcing each face (4.5+/- psf). The outside surface of the perimeter foundation walls will receive a troweled-on bituminous mastic.*
- Typical perimeter frost wall continuous footing: *2'-0" wide, by 12" deep, with continuous reinforcing bars, plus dowels to the foundation wall (10.0+/- plf). The bottom of footing will be placed 4'-0" minimum below the exterior finish grade for frost protection.*
- Cantilever retaining walls (along the south/back side of the addition): *16" thick, with horizontal and vertical reinforcing each face (9.5 +/- psf). The outside surface of the cantilever foundation walls will receive a troweled-on bituminous mastic.*
- Cantilever retaining wall continuous footing: *8'-6" wide, by 1'-6" deep, with 9.5 psf reinforcing. The bottom of the footing will be approximately 4'-0" below the Parking Level bituminous concrete slab on grade.*
- Typical, average interior column footing: *10'-0" x 10'-0" x 2'-4" deep, with 1000 pounds of reinforcing. The bottom of the footing will be approximately 4'-0" below the Parking Level bituminous concrete slab on grade.*
- Typical, average perimeter column footing: *8'-0" x 8'-0" x 2'-0" deep, with 560 pounds of reinforcing. The bottom of the footing will be approximately 4'-0" below the Parking Level bituminous concrete slab on grade.*
- Typical piers/pilasters at interior/perimeter columns: *22 inches square, reinforced concrete with 45 plf reinforcing.*
- Typical grade beams interconnecting footings in bracing bays: *2'-0" wide by 2'-0" deep with 50 plf reinforcing (assume 240 linear feet required).*

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- Foundation Wall Dampproofing: *ASTM D1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; Type II, Class I, non-asbestos fibers.*
- Anchor Bolts: Anchor bolts at column base plates shall conform to ASTM F1554 – Grade 36 and shall be headed type. Provide a minimum of four (4), ¾" diameter anchor bolts at all columns; additional bolts and/or larger diameter bolts will be required at bracing locations.

A1020 – Special Foundations

- Elevator pit: Elevator pit construction will consist of 12" thick, reinforced concrete walls and an 18" thick, reinforced concrete foundation mat, with an integral sump pit. Waterstops will be provided at all construction joints and all interior surfaces of the elevator pit will be waterproofed. Elevator shaft walls will be 100% solid grouted, reinforced CMU construction (8" thick).

A1030 – Slabs on Grade

Parking Level floor construction in occupied/enclosed areas will typically be a 5" thick concrete slab on grade, reinforced with welded wire fabric. The slab will be underlain by a heavy duty (16-mil) vapor barrier, rigid insulation, and 6" of compacted slab base fill. Saw cut control joints (1¼" deep) will be provided in each direction at each column line. Full depth isolation joints will be constructed around columns. The Mechanical Room will be similar construction, with a 6" thick concrete slab on grade. A bituminous concrete slab on grade will be provided at parking areas.

- Welded wire fabric for concrete slabs on grade: 6x6-W2.9xW2.9

B. SHELL

B10: Superstructure

Structural Bays/Spans: The typical structural bay will be approximately 30'-0" x 30'-0".

Story Heights: Story heights will be approximately 14'-0"; the Second Floor of the addition will match the lowest level floor level of the existing building (Elevation 174.25'+/-).

Steel Framing Connections: Type 2 simple framing connections (shear only); double clip angles typically.

Columns: Typical columns will be rectangular steel tube (HSS) sections.

Lateral Force Resisting System: Lateral (wind and seismic) forces will be resisted by steel bracing, for reasons of economy, stiffness, reduced structural depth and smaller column sizes. Bracing members will be square or rectangular HSS sections. Brace configurations may include chevrons, inverted chevrons ("V"), or single diagonals in short bays, as required by architectural considerations.

Expansion (Seismic) Joints: There will be no internal expansion joints in the addition; however, expansion joints will be required at the interface of the two links/bridges and the existing building.

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Fire Protection: As previously noted, addition will be classified at Type IIB Construction (Noncombustible, Unprotected). The addition will be fully sprinklered. Typical floor and roof construction will not require fire protection, except those members supporting rated enclosures. All steel framed construction is considered to be *restrained*.

B1010 – Floor Construction

First and Second Floor Construction: Composite structural steel framing: 3½" thick (minimum), normal weight concrete topping slab with welded wire fabric on 2" deep, 18 gauge, composite type, galvanized steel floor deck (5½" minimum total slab thickness), supported by composite wide flange steel beams, spaced at 7+/- feet to 8+/- feet o.c. Steel beams are supported by composite wide flange steel girders. Steel girders span to HSS (tubular) steel columns. Slabs on steel deck will be placed at the required elevation, adding concrete to compensate for the deflection of the (unshored) steel framing (approximately ¾" average additional concrete in each structural bay). In all areas, composite action between the steel beams/girders and the concrete slab on steel deck will be achieved by field welding ¾" diameter, 4" long headed shear connectors to the top flanges. Floor finishing will be coordinated with flooring requirements.

- Welded wire fabric for slabs on steel form deck and slabs on composite steel deck: 6x6-W2.9xW2.9.
- The estimated weight of structural steel at the First and Second Floors of the addition including beams, columns, bracing, plates, relieving angles, miscellaneous frames, connections, etc. is as follows:

Structural Steel Weight: 13.5 psf

- Shear Studs: Assume 25, ¾" diameter, 4" long headed shear studs per 100 square feet of composite steel framed floor area.

B1020 – Roof Construction

Typical Roof Construction: Typical roof construction consists of a 1½" deep, 18 gauge, Type WR galvanized steel roof deck spanning to wide flange steel beams. Steel beams are typically supported by wide flange steel girders, which span to HSS (tube) steel columns.

Rooftop Mechanical Equipment Areas: Concrete slabs on composite steel deck will be provided below rooftop mechanical units, for acoustical purposes (similar to floor construction, described above).

Drainage: Roof drainage will be achieved by tapered insulation, or by pitching structural steel where practical.

- The estimated weight of structural steel at the Roof Level of the addition (including beams, columns, bracing, girts, plates, angles, relieving angles, miscellaneous frames and connections; but excluding entry canopies, loose lintels, etc.) is as follows:

Structural Steel Weight: 13.0 psf

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B20: Exterior Enclosure

B2010 – Exterior Walls

Exterior wall construction will be a mixture of masonry veneer/steel stud cavity wall construction, along with areas of glazed curtainwall and architectural panels. Galvanized steel loose lintels will be provided at the heads of typical, punched window openings. Continuous galvanized relieving angles will be provided at larger and/or multiple, minimally separated window openings, and at locations where the height of masonry exceeds 30 feet.

The steel stud backup will be 16 gauge minimum studs, designed for an H/600 deflection limitation. Vertical slip joints will be provided in the metal stud backup system at each level. Ties to the masonry veneer will be installed at 16" o.c. horizontally and vertically.

IV. OUTLINE SPECIFICATION

Concrete:

- All concrete shall be normal weight, 4,000 psi at 28 days, except foundation walls and footings, which shall be normal weight, 3,000 psi and exterior (exposed) concrete (paving) which shall be normal weight, 4,500 psi.
- Portland Cement: ASTM C150, Type I or II.
- Fly Ash: ASTM C618, Class F. Replacement of cement content with fly ash is limited to 20% (by weight). Fly ash is not permitted in exterior, exposed concrete, slabs on grade or slabs on steel deck.
- All concrete shall be proportioned with 3/4" maximum aggregate, ASTM C 33, except 3/8" maximum aggregate shall be used at toppings less than 2" thick (e.g. metal pan stairs).
- All reinforcing shall be ASTM A 615 deformed bars, Grade 60.
- All welded wire fabric shall conform to ASTM A 185.
- Reinforcing bars, steel wire, welded wire fabric, and miscellaneous steel accessories shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with Submittal Requirements.
- Concrete products manufactured within 500 miles (by air) of the project site shall be documented in accordance with Submittal Requirements.
- Cure all concrete by moisture retention methods, approved by Architect; curing compounds shall not be used.

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Reinforced Concrete Masonry (Elevator Shaft):

- Masonry construction shall conform to ACI 530/ASCE 5/TMS 402 “Building Code Requirements for Masonry Structures”, latest edition.
- Masonry strength, $f'm$ shall not be less than 1350 psi.
- Requirements for load bearing block strength shall be as required for specified masonry strength ($f'm$) but shall not be less than 2000 psi on the net area of the block.
- Grout shall conform to ASTM C476, Type Fine, and shall be of strength required for specified masonry strength ($F'm$) but not less than 3000 psi.
- Mortar for reinforced masonry shall conform to ASTM C 270 Type S and shall be of strength required for specified masonry strength ($f'm$) but not less than 1800 psi.
- Reinforcing bars shall conform to ASTM A 615 Grade 60 deformed bars. Lap all continuous bars 48 diameters and provide bar positioners. Assume No. 5 bars at 2'-8" o.c. vertically and horizontal bond beams with 2 – No. 5 continuous at 4'-0" o.c.
- Joint reinforcing shall be 9 gauge ladder type conforming to ASTM A 82. Provide prefabricated corners and tees. Walls shall be reinforced horizontally with joint reinforcing at 16 inches on centers unless otherwise noted.
- Reinforcing bars, steel wire and miscellaneous accessories shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with Submittal Requirements.
- Elevator shaft walls shall be 100% solid grouted (all cores); low lift grouting.
- Masonry products manufactured within 500 miles (by air) of the project site shall be documented in accordance with Submittal Requirements.

Structural Steel:

- Structural steel shapes shall conform to ASTM A 992, $F_y = 50$ ksi.
- Steel tubes (HSS) shall conform to ASTM A 500, Grade B/C, $F_y = 50$ ksi.
- Structural steel plates and bars shall conform to ASTM A 36, $F_y = 36$ ksi.
- Steel members shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements.
- Steel manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements.
- Anchor Bolts: Anchor bolts at column base plates shall conform to ASTM F1554 – Grade 36 and shall be headed type. Provide a minimum of four (4), $\frac{3}{4}"$ diameter anchor

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bolts at all columns; additional bolts and/or larger diameter will be required at bracing locations.

- Bolted connections shall be ASTM A 325, Type N (bearing) bolts, except slip-critical bolts shall be used at lateral brace beam connections.
- Shear connectors shall be $\frac{3}{4}$ " diameter, 4" long, headed Nelson studs conforming to ASTM A 108.
- Shop and field welding shall be AWS D1.1 E70XX electrodes.
- Surface treatment for typical structural steel: SSPC Surface Preparation No. 3 (Power Tool Cleaning). Structural steel shall be left unprimed.
- Surface treatment for Exposed to View Structural Steel (E.V.S.S.) in the Gymnasium and the Cafetorium shall be SSPC Surface Preparation No. 6 (Commercial Blast Cleaning). Structural steel shall receive one coat of shop primer that is compatible with the finish paint.
- All exterior, exposed structural steel shall be hot-dipped galvanized.

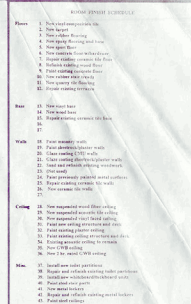
Steel Deck:

- Typical steel roof deck shall be 1½" deep, 18 gauge, Type WR, conforming to ASTM A653, Grade 33 (minimum), galvanized in accordance with ASTM A 653, coating class G-60.
- Typical steel floor deck shall be 2" deep, 18 Gauge, composite type, conforming to ASTM A 653, Grade 33, galvanized in accordance with ASTM A 653, coating class G-60.
- All steel floor deck and roof deck accessories (pour stops, finish strips, closures, etc.) shall be the same finish as the deck; 18 gauge minimum.
- Steel deck shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements.
- Steel deck manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements.
- Provide 14 gauge sump pans at roof drains.

End of Structural Narrative

Appendix D

Renovation Diagrams



- ☐ SHARED
- ☐ CORE
- ☐ SPEC/SUPT



ADDITIONS AND RENOVATIONS
TO THE
OTTOSON MIDDLE SCHOOL

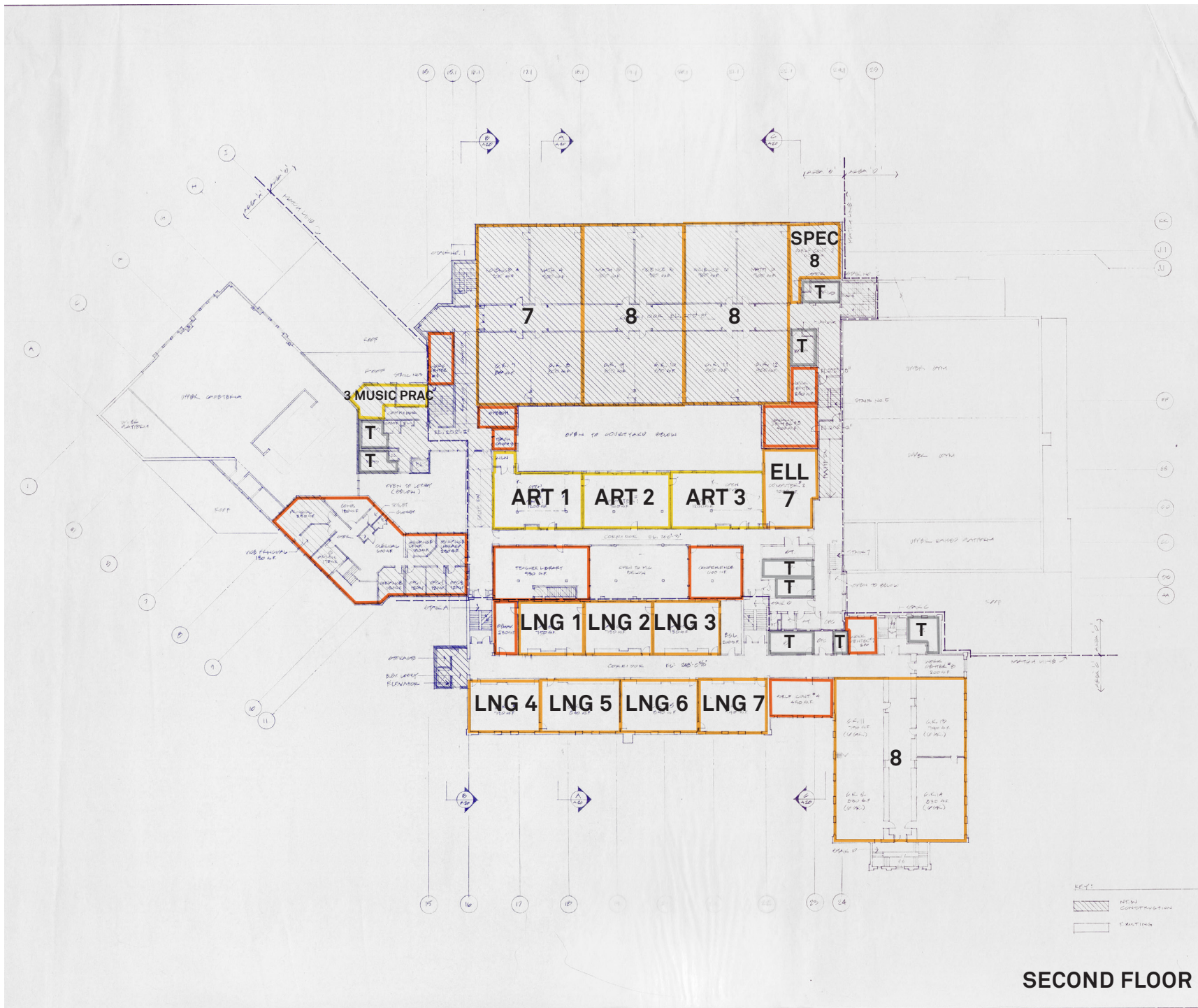
**STREKALOVSKY
& HOIT**
ARCHITECTS INC.
51 NORTH STREET
HINGHAM MASSACHUSETTS
7494160

LEVEL 2 FLOOR PLAN

DATE	3-25-96	DRAWN BY:	CHECKED BY:
SCALE:	AS SHOWN	AA	
REVISION DATES		PROJECT NUMBER:	19000
		DRAWING NUMBER:	

A.2

FIRST FLOOR



KEY:

- NEW CONSTRUCTION
- EXISTING

LEGEND:

- SHARED
- CORE
- SPEC/SUPT

NOTES:

1. See notes on page 1.
2. See notes on page 1.
3. See notes on page 1.
4. See notes on page 1.
5. See notes on page 1.
6. See notes on page 1.
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21. See notes on page 1.
22. See notes on page 1.
23. See notes on page 1.
24. See notes on page 1.

REVISIONS:

DATE	BY	DESCRIPTION
10/10/10	J. H.	1. Initial drawing

PROJECT INFORMATION:

DATE: 10/10/10
SCALE: 1/8" = 1'-0"
PROJECT NUMBER: 2400-1
DRAWING NUMBER: 2400-1

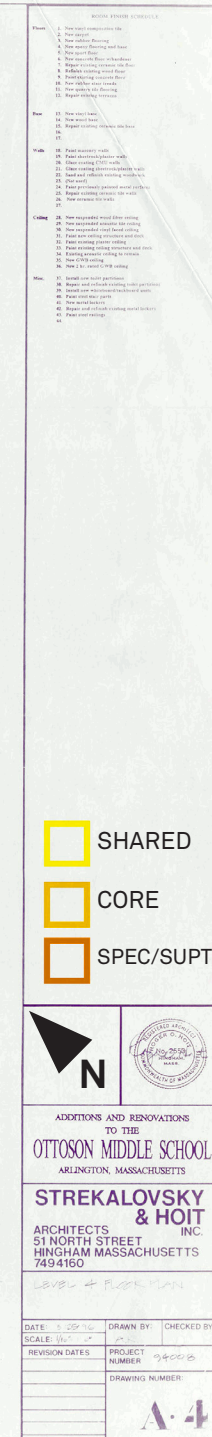
STREKALOVSKY & HOIT, INC.
ARCHITECTS
51 NORTH STREET
HINGHAM MASSACHUSETTS
01931

OTTON MIDDLE SCHOOL
ARLINGTON, MASSACHUSETTS

ADDITIONS AND RENOVATIONS TO THE

LEVEL 3 FIRST PLAN

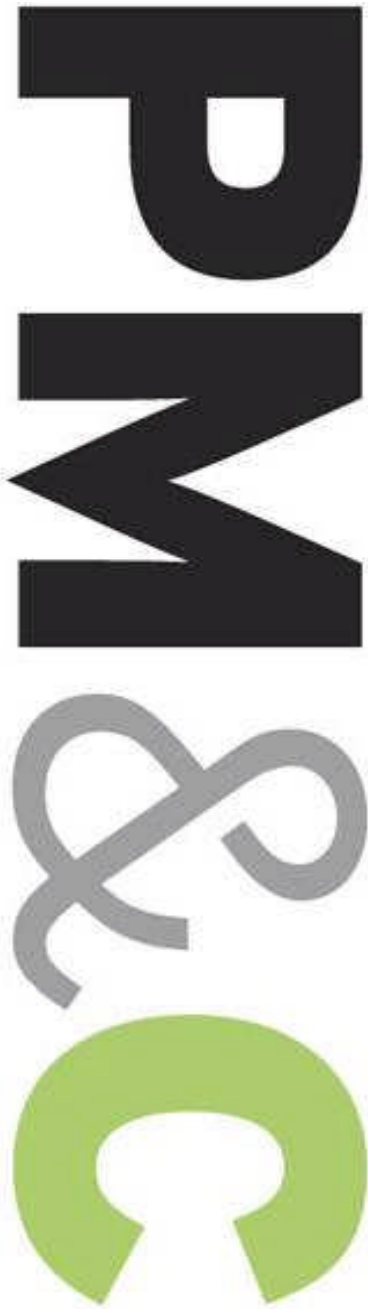
SECOND FLOOR



THIRD FLOOR

Appendix E

Feasibility Study
Design Estimate



Feasibility Design Estimate

Ottoson Middle School RENOVATIONS + ADDITION

Arlington, MA

PM&C LLC
20 Downer Avenue, Suite 1c
Hingham, MA 02043
(T) 781-740-8007
(F) 781-740-1012

Prepared for:

HMFH Architects, Inc

April 25, 2016



Ottoson Middle School
RENOVATIONS + ADDITION
 Arlington, MA

25-Apr-16

Feasibility Design Estimate

MAIN CONSTRUCTION COST SUMMARY

	Construction Start	Gross Floor Area	\$/sf	Estimated Construction Cost
RENOVATION + ADDITION				
RENOVATE EXISTING SCHOOL		154,380	\$9.46	\$1,460,681
ADDITION		39,580	\$294.31	\$11,648,810
SITEWORK				\$646,659
SUB-TOTAL	Apr-17	193,960	\$70.92	\$13,756,150
ESCALATION TO START - (assumed 4% PA)	4.0%			\$550,246
DESIGN AND PRICING CONTINGENCY	12%			\$1,650,738
SUB-TOTAL		193,960	\$82.27	\$15,957,134
GENERAL CONDITIONS				\$1,276,571
GENERAL REQUIREMENTS	3.00%			\$478,714
BONDS	1.00%			\$159,571
INSURANCE	1.25%			\$199,464
PERMIT				NIC
OVERHEAD AND FEE	3.00%			\$478,714
GMP CONTINGENCY				\$478,714
TOTAL OF ALL CONSTRUCTION	Apr-17	193,960	\$98.11	\$19,028,882

ALTERNATES

ADDED MULTIPURPOSE ROOM TO NEW ADDITION	ADD	\$609,225
ALTERNATE HVAC -1		
Add DX partial cooling for New Addition classrooms	ADD	\$191,171
ALTERNATE HVAC -2		
Add displacement ventilation with partial cooling and dehumidification to new addition	ADD	\$245,792



Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

This Feasibility Design cost estimate was produced from drawings, narratives, outline specifications and other documentation prepared by HMFH Architects Inc. and their design team dated April 6, 2016. Design and engineering changes occurring subsequent to the issue of these documents have not been incorporated in this estimate.

This estimate includes all direct construction costs, construction manager's overhead, fee and design contingency. Cost escalation assumes start dates indicated.

Bidding conditions are expected to be public bidding under Chapter 149a of the Massachusetts General Laws to pre-qualified construction managers, and pre-qualified sub-contractors, open specifications for materials and manufactures.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT CONSIDERED IN THIS ESTIMATE

Items not included in this estimate are:

- Land acquisition, feasibility, and financing costs
- All professional fees and insurance
- Site or existing conditions surveys investigations costs, including to determine subsoil conditions
- All Furnishings, Fixtures and Equipment
- Items identified in the design as Not In Contract (NIC)
- Items identified in the design as by others
- Owner supplied and/or installed items as indicated in the estimate
- Utility company back charges, including work required off-site
- Work to City streets and sidewalks, (except as noted in this estimate)
- Construction contingency



Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 154,380

CONSTRUCTION COST SUMMARY					
<i>BUILDING SYSTEM</i>		<i>SUB-TOTAL</i>	<i>TOTAL</i>	<i>\$/SF</i>	<i>%</i>
RENOVATION TO EXISTING BUILDING					
A10 FOUNDATIONS					
A1010	Standard Foundations	\$0			
A1020	Special Foundations	\$0			
A1030	Lowest Floor Construction	\$15,260	\$15,260	\$0.10	1.0%
B10 SUPERSTRUCTURE					
B1010	Upper Floor Construction	\$5,000			
B1020	Roof Construction	\$0	\$5,000	\$0.03	0.3%
B20 EXTERIOR CLOSURE					
B2010	Exterior Walls	\$0			
B2020	Windows/Curtainwall	\$0			
B2030	Exterior Doors	\$0	\$0	\$0.00	0.0%
B30 ROOFING					
B3010	Roof Coverings	\$0			
B3020	Roof Openings	\$0	\$0	\$0.00	0.0%
C10 INTERIOR CONSTRUCTION					
C1010	Partitions	\$218,400			
C1020	Interior Doors	\$0			
C1030	Specialties/Millwork	\$25,438	\$243,838	\$1.58	16.7%
C20 STAIRCASES					
C2010	Stair Construction	\$2,400			
C2020	Stair Finishes	\$0	\$2,400	\$0.02	0.2%
C30 INTERIOR FINISHES					
C3010	Wall Finishes	\$302,850			
C3020	Floor Finishes	\$170,050			
C3030	Ceiling Finishes	\$96,293	\$569,193	\$3.69	39.0%
D10 CONVEYING SYSTEMS					
D1010	Elevator	\$0	\$0	\$0.00	0.0%
D20 PLUMBING					
D20	Plumbing	\$78,000	\$78,000	\$0.51	5.3%
D30 HVAC					
D30	HVAC	\$167,500	\$167,500	\$1.08	11.5%
D40 FIRE PROTECTION					
D40	Fire Protection	\$0	\$0	\$0.00	0.0%
D50 ELECTRICAL					
D5010	Electrical Systems	\$121,600	\$121,600	\$0.79	8.3%
E10 EQUIPMENT					



Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 154,380

CONSTRUCTION COST SUMMARY					
<i>BUILDING SYSTEM</i>		<i>SUB-TOTAL</i>	<i>TOTAL</i>	<i>\$/SF</i>	<i>%</i>
RENOVATION TO EXISTING BUILDING					
E10	Equipment	\$52,000	\$52,000	\$0.34	3.6%
E20 FURNISHINGS					
E2010	Fixed Furnishings	\$110,560			
E2020	Movable Furnishings	NIC	\$110,560	\$0.72	7.6%
F10 SPECIAL CONSTRUCTION					
F10	Special Construction	\$0	\$0	\$0.00	0.0%
F20 SELECTIVE BUILDING DEMOLITION					
F2010	Building Elements Demolition	\$95,330			
F2020	Hazardous Components Abatement	\$0	\$95,330	\$0.62	6.5%
TOTAL DIRECT COST (Trade Costs)			\$1,460,681	\$9.46	100.0%



Ottoson Middle School
 RENOVATIONS + ADDITION
 Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 154,380

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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RENOVATION TO EXISTING BUILDING

TOTAL GROSS FLOOR AREA (GFA)	154,380	GSF
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A10 FOUNDATIONS

A1010 STANDARD FOUNDATIONS

No work in this section

SUBTOTAL

-

A1020 SPECIAL FOUNDATIONS

No work in this section

SUBTOTAL

A1030 LOWEST FLOOR CONSTRUCTION

Cutting and patching for new plumbing

763

sf

20.00

15,260

SUBTOTAL

15,260

TOTAL - FOUNDATIONS	\$15,260
----------------------------	-----------------

B10 SUPERSTRUCTURE

B1010 FLOOR CONSTRUCTION

Fire stopping floors

1

ls

5,000.00

5,000

SUBTOTAL

5,000

B1020 ROOF CONSTRUCTION

No work in this section

SUBTOTAL

-

TOTAL - SUPERSTRUCTURE	\$5,000
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B20 EXTERIOR CLOSURE

B2010 EXTERIOR WALLS

No work assumed to existing exterior

SUBTOTAL

-

B2020 WINDOWS/CURTAINWALL

No work assumed to existing exterior

SUBTOTAL

-

B2030 EXTERIOR DOORS

No work assumed to existing exterior

SUBTOTAL

-

TOTAL - EXTERIOR CLOSURE	
---------------------------------	--

B30 ROOFING

B3010 ROOF COVERINGS

No work assumed to existing exterior

SUBTOTAL

-

B3020 ROOF OPENINGS

No work in this section

SUBTOTAL

-

TOTAL - ROOFING	
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Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 154,380

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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RENOVATION TO EXISTING BUILDING

C10 INTERIOR CONSTRUCTION

C1010 PARTITIONS

Operable partitions at blue gym	2,912	sf	75.00	218,400	
SUBTOTAL					218,400

C1020 INTERIOR DOORS

No work in this section					
SUBTOTAL					-

C1030 SPECIALTIES / MILLWORK

Room Signs	1	ls	10,000.00	10,000	
Miscellaneous sealants throughout building	154,380	sf	0.10	15,438	
SUBTOTAL					25,438

TOTAL - INTERIOR CONSTRUCTION \$243,838

C20 STAIRCASES

C2010 STAIR CONSTRUCTION

New handrails at cafeteria	8	loc	300.00	2,400	
SUBTOTAL					2,400

C2020 STAIR FINISHES

No work in this section					
SUBTOTAL					-

TOTAL - STAIRCASES \$2,400

C30 INTERIOR FINISHES

C3010 WALL FINISHES

Paint to walls etc.	154,380	gfa	1.50	231,570	
Ceramic tile, full height	3,240	sf	22.00	71,280	
SUBTOTAL					302,850

C3020 FLOOR FINISHES

Carpet to library	8,500	sf	4.33	36,805	
LFT at music classroom and science classrooms	3,600	sf	4.00	14,400	
Ceramic tile to toilets	763	sf	20.00	15,260	
Patch existing floors at removed walls	310	lf	30.00	9,300	
Rubber base	25,730	lf	2.50	64,325	
Ceramic tile base	360	lf	16.00	5,760	
Floor prep	12,100	sf	2.00	24,200	
SUBTOTAL					170,050

C3030 CEILING FINISHES

ACT, 2x2	12,100	sf	5.00	60,500	
GWB ceiling	763	sf	10.00	7,630	
Patch existing ceilings at removed walls	310	lf	40.00	12,400	
Paint GWB	763	sf	1.00	763	
Soffits	1	ls	15,000.00	15,000	
SUBTOTAL					96,293

TOTAL - INTERIOR FINISHES \$569,193



Ottoson Middle School
 RENOVATIONS + ADDITION
 Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 154,380

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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RENOVATION TO EXISTING BUILDING

D10 CONVEYING SYSTEMS

No work in this section
 SUBTOTAL

-

TOTAL - CONVEYING SYSTEMS

D20 PLUMBING

D20 PLUMBING, GENERALLY

New sinks at science/art rooms	14	ft	5,000.00	70,000	
Eye wash station	2	loc	4,000.00	8,000	
SUBTOTAL					78,000

TOTAL - PLUMBING

\$78,000

D30 HVAC

D30 HVAC, GENERALLY

HVAC modifications at library modifications	8,500	sf	15.00	127,500	
HVAC modifications at music room modifications	1,200	sf	15.00	18,000	
Exhaust modifications at bathrooms	11	loc	2,000.00	22,000	
SUBTOTAL					167,500

TOTAL - HVAC

\$167,500

D40 FIRE PROTECTION

D40 FIRE PROTECTION, GENERALLY

New sprinkler system - assumed not required				ETR	
SUBTOTAL					-

TOTAL - FIRE PROTECTION

D50 ELECTRICAL

D5010 COMPLETE ELECTRICAL SYSTEMS

Lighting, power and Tele/Data at library modifications	8,500	sf	12.00	102,000	
Power/Data at computer classrooms	2	rms	5,000.00	10,000	
Lighting at music room modifications	1,200	sf	8.00	9,600	
SUBTOTAL					121,600

TOTAL - ELECTRICAL

\$121,600

E10 EQUIPMENT

E10 EQUIPMENT, GENERALLY

New fume hoods	2	ea	11,000.00	22,000	
Replace gym bleachers	1	ls	30,000.00	30,000	
SUBTOTAL					52,000

TOTAL - EQUIPMENT

\$52,000

E20 FURNISHINGS



Ottoson Middle School
 RENOVATIONS + ADDITION
 Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 154,380

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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RENOVATION TO EXISTING BUILDING

E2010 FIXED FURNISHINGS

<i>Science Classrooms</i>	2	rms					
Base cabinets and Epoxy counters	112	lf	450.00	50,400			
Wall cabinets	112	lf	300.00	33,600			
Tall storage	4	ea	1,400.00	5,600			
<i>FACS/Art</i>	2	rms					
Base cabinets and plam counters	32	lf	300.00	9,600			
Wall cabinets	32	lf	180.00	5,760			
Tall storage	4	ea	1,400.00	5,600			
SUBTOTAL						110,560	

E2020 MOVABLE FURNISHINGS

All movable furnishings to be provided and installed by owner							
SUBTOTAL						NIC	

TOTAL - FURNISHINGS

\$110,560

F10 SPECIAL CONSTRUCTION

F10 SPECIAL CONSTRUCTION

No items in this section
 SUBTOTAL

TOTAL - SPECIAL CONSTRUCTION

F20 SELECTIVE BUILDING DEMOLITION

F2010 BUILDING ELEMENTS DEMOLITION

Remove existing GWB walls	4,340	sf	2.00	8,680			
Demolish existing floor slab	763	sf	12.00	9,156			
Remove floor finishes	12,863	sf	2.00	25,726			
Remove ceilings	13,173	sf	1.00	13,173			
Miscellaneous demo/protection	154,380	gfa	0.25	38,595			
SUBTOTAL						95,330	

F2020 HAZARDOUS COMPONENTS ABATEMENT

None Included
 SUBTOTAL

TOTAL - SELECTIVE BUILDING DEMOLITION

\$95,330



Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 39,580

CONSTRUCTION COST SUMMARY					
<i>BUILDING SYSTEM</i>		<i>SUB-TOTAL</i>	<i>TOTAL</i>	<i>\$/SF</i>	<i>%</i>
ADDITION					
A10 FOUNDATIONS					
A1010	Standard Foundations	\$503,120			
A1020	Special Foundations	\$0			
A1030	Lowest Floor Construction	\$66,562	\$569,682	\$14.39	4.9%
A20 BASEMENT CONSTRUCTION					
A2010	Basement Excavation	\$0			
A2020	Basement Walls	\$0	\$0	\$0.00	0.0%
B10 SUPERSTRUCTURE					
B1010	Upper Floor Construction	\$1,361,452			
B1020	Roof Construction	\$701,882	\$2,063,334	\$52.13	17.7%
B20 EXTERIOR CLOSURE					
B2010	Exterior Walls	\$1,013,860			
B2020	Windows	\$941,857			
B2030	Exterior Doors	\$30,121	\$1,985,838	\$50.17	17.0%
B30 ROOFING					
B3010	Roof Coverings	\$511,568			
B3020	Roof Openings	\$2,500	\$514,068	\$12.99	4.4%
C10 INTERIOR CONSTRUCTION					
C1010	Partitions	\$863,042			
C1020	Interior Doors	\$197,900			
C1030	Specialties/Millwork	\$262,572	\$1,323,514	\$33.44	11.4%
C20 STAIRCASES					
C2010	Stair Construction	\$128,000			
C2020	Stair Finishes	\$29,320	\$157,320	\$3.97	1.4%
C30 INTERIOR FINISHES					
C3010	Wall Finishes	\$237,480			
C3020	Floor Finishes	\$316,640			
C3030	Ceiling Finishes	\$398,180	\$952,300	\$24.06	8.2%
D10 CONVEYING SYSTEMS					
D1010	Elevator	\$120,000	\$120,000	\$3.03	1.0%
D20 PLUMBING					
D20	Plumbing	\$554,120	\$554,120	\$14.00	4.8%



Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 39,580

CONSTRUCTION COST SUMMARY					
<i>BUILDING SYSTEM</i>		<i>SUB-TOTAL</i>	<i>TOTAL</i>	<i>\$/SF</i>	<i>%</i>
ADDITION					
D30 HVAC					
D30 HVAC		\$1,424,880	\$1,424,880	\$36.00	12.2%
D40 FIRE PROTECTION					
D40 Fire Protection		\$253,810	\$253,810	\$6.41	2.2%
D50 ELECTRICAL					
D5010 Complete System		\$1,369,080	\$1,369,080	\$34.59	11.8%
E10 EQUIPMENT					
E10 Equipment		\$0	\$0	\$0.00	0.0%
E20 FURNISHINGS					
E2010 Fixed Furnishings		\$340,864			
E2020 Movable Furnishings	NIC		\$340,864	\$8.61	2.9%
F10 SPECIAL CONSTRUCTION					
F10 Special Construction		\$0	\$0	\$0.00	0.0%
F20 HAZMAT REMOVALS					
F2010 Building Elements Demolition		\$20,000			
F2020 Hazardous Components Abatement		\$0	\$20,000	\$0.51	0.2%
TOTAL DIRECT COST (Trade Costs)			\$11,648,810	\$294.31	100.0%



Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA

39,580

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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ADDITION

GROSS FLOOR AREA CALCULATION

Parking Level	3,100
First Floor	18,240
Second Floor	18,240

TOTAL GROSS FLOOR AREA (GFA)

39,580 sf

A10 FOUNDATIONS

A1010 STANDARD FOUNDATIONS

Strip footings - 2'-0" x 1'-0"

Excavation	282	cy	12.00	3,384
Store on site for reuse	282	cy	14.00	3,948
Backfill with new fill	262	cy	16.00	4,192
Formwork	508	sf	11.00	5,588
Re-bar, 10#/lf	2,540	lbs	1.20	3,048
Concrete material; 3,000 psi	20	cy	125.00	2,500
Placing concrete	20	cy	55.00	1,100

Foundation walls at exterior - 14" thick

Formwork	2,032	sf	12.50	25,400
Re-bar, 4.5#/sf	4,572	lbs	1.20	5,486
Concrete material; 4,000 psi	46	cy	135.00	6,210
Placing concrete	46	cy	65.00	2,990
Dampproofing foundation wall and footing	1,524	sf	1.90	NIC
Insulation to foundation walls; 2" thick	1,016	sf	2.50	2,540
Form shelf	254	lf	8.00	2,032

Strip footings at retaining walls - 8'-6" x 1'-6"

Excavation	472	cy	12.00	5,664
Store on site for reuse	472	cy	14.00	6,608
Backfill with new fill	371	cy	16.00	5,936
Formwork	612	sf	11.00	6,732
Re-bar	16,473	lbs	1.20	19,768
Concrete material; 3,000 psi	101	cy	125.00	12,625
Placing concrete	101	cy	55.00	5,555

Retaining walls at exterior - 16" thick

Formwork	5,712	sf	16.00	91,392
Re-bar, 9.5#/sf	27,132	lbs	1.20	32,558
Concrete material; 4,000 psi	148	cy	135.00	19,980
Placing concrete	148	cy	65.00	9,620
Waterproofing foundation wall and footing	2,448	sf	8.00	19,584
Insulation to foundation walls; 2" thick	2,448	sf	2.50	6,120
Form shelf	204	lf	8.00	1,632

Grade Beams

Excavation	267	cy	12.00	3,204
Store on site for reuse	267	cy	14.00	3,738
Backfill with new fill	230	cy	16.00	3,680
Formwork	960	sf	11.00	10,560
Re-bar, 50#/lf	12,000	lbs	1.20	14,400
Concrete material; 3,000 psi	37	cy	125.00	4,625
Placing concrete	37	cy	55.00	2,035

Exterior column footings, typical, 8' x 8' x 2'-0"

Excavation	372	cy	15.00	5,580
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Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA

39,580

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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ADDITION

56	Store on site for reuse	372	cy	14.00	5,208		
57	Backfill with new fill	262	cy	16.00	4,192		
58	Formwork	1,408	sf	11.00	15,488		
59	Re-bar	12,320	lbs	1.20	14,784		
60	Concrete material; 3,000 psi	110	cy	125.00	13,750		
61	Placing concrete	110	cy	55.00	6,050		
62	Set anchor bolts grout plates	22	ea	150.00	3,300		
63	<u>Interior column footings, typical, 10' x 10' x 2'-4"</u>						
64	Excavation	276	cy	15.00	4,140		
65	Store on site for reuse	276	cy	14.00	3,864		
66	Backfill with new fill	167	cy	16.00	2,672		
67	Formwork	1,118	sf	11.00	12,298		
68	Re-bar	12,000	lbs	1.20	14,400		
69	Concrete material; 3,000 psi	109	cy	125.00	13,625		
70	Placing concrete	109	cy	55.00	5,995		
71	Set anchor bolts grout plates	12	ea	150.00	1,800		
72	<u>Interior pilasters</u>						
73	Formwork	996	sf	11.00	10,956		
74	Re-bar	6,120	lbs	1.20	7,344		
75	Concrete material; 3,000 psi	18	cy	125.00	2,250		
76	Placing concrete	18	cy	55.00	990		
77	SUBTOTAL					503,120	

A1020 SPECIAL FOUNDATIONS

No Work in this section

SUBTOTAL

A1030 LOWEST FLOOR CONSTRUCTION

New Slab on grade, 5" thick

84	Structural gravel fill, 8"	77	cy	30.00	2,310		
85	Base course, 8" gravel	77	cy	35.00	2,695		
86	Rigid insulation	3,100	sf	2.25	6,975		
87	Vapor barrier	3,100	sf	1.00	3,100		
88	Mesh reinforcing 15% lap	3,565	sf	0.80	2,852		
89	Concrete - 5" thick	51	cy	125.00	6,375		
90	Placing concrete	51	cy	45.00	2,295		
91	Finishing and curing concrete	3,100	sf	1.50	4,650		
92	Control joints - saw cut	3,100	sf	0.10	310		
93	<u>Miscellaneous</u>						
94	New Elevator pits	1	ea	30,000.00	30,000		
95	Equipment pads - allow	1	ls	5,000.00	5,000		
96	SUBTOTAL					66,562	

TOTAL - FOUNDATIONS

\$569,682

A20 BASEMENT CONSTRUCTION

A2010 BASEMENT EXCAVATION

No items in this section

SUBTOTAL

A2020 BASEMENT WALLS

No items in this section

SUBTOTAL



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ADDITION

TOTAL - BASEMENT CONSTRUCTION

B10 SUPERSTRUCTURE

B1010 FLOOR CONSTRUCTION

Floor Structure - Steel:

Steel beams and columns; 13.5/SF; including garage level structure

18 lbs/sf
365 tns

246 tns 3,800.00 934,800

Shear studs

7,296 ea 2.50 18,240

Floor Structure

2" Metal floor Deck

36,480 sf 3.00 109,440

WWF reinforcement

41,952 sf 0.80 33,562

Concrete Fill to metal deck; 5 1/2" Normal weight

650 cy 125.00 81,250

Place and finish concrete

36,480 sf 2.00 72,960

Miscellaneous

Exposed steel premium

1 ls 10,000.00 10,000

Fire proofing to columns and beams

36,480 sf 2.50 91,200

Fire stopping floors

2 flrs 5,000.00 10,000

SUBTOTAL

1,361,452

B1020 ROOF CONSTRUCTION

Roof Structure - Steel:

Steel beams/Joists; 13#/SF

119 tns 3,800.00 452,200

Roof Structure

1-1/2" Metal floor Deck @ roof

18,240 sf 3.00 54,720

Roof Structure @ Mech Equipment/Low roof

WWF reinforcement

9,315 sf 0.80 7,452

Concrete Fill to metal deck; 5 1/4" Light weight

129 cy 170.00 21,930

Place and finish concrete

8,100 sf 3.00 24,300

Miscellaneous

Premium for bridge framing

1 ls 60,000.00 60,000

Roof screen framing - allow

1,100 sf 20.00 22,000

Fire proofing to columns, beams and deck

18,240 sf 3.25 59,280

SUBTOTAL

701,882

TOTAL - SUPERSTRUCTURE

\$2,063,334

B20 EXTERIOR CLOSURE

B2010 EXTERIOR WALLS; 60% solid/40% glass

Interior skin

6" metal stud backup

11,634 sf 7.50 87,255

Batt insulation in stud

11,634 sf 2.25 26,177

2 1/2" Rigid Insulation

11,634 sf 3.00 34,902

Air barrier

11,634 sf 6.00 69,804

Air barrier/flashing at windows

2,272 lf 7.00 15,904

Gypsum Sheathing

11,634 sf 2.75 31,994

Drywall lining to interior face of stud backup

11,634 sf 3.00 34,902

Interior skin @ garage level

8" CMU backup

2,134 sf 22.00 46,948

2 1/2" Rigid Insulation

2,134 sf 3.00 6,402



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ADDITION

164	Air barrier	2,134	sf	6.00	12,804		
165	Exterior skin						
166	Brick veneer; 75% of exterior wall	10,326	sf	35.00	361,410		
167	Metal panels; 25% of exterior wall	3,442	sf	60.00	206,520		
168	Miscellaneous						
169	Aluminum sign at main entrance	1	ls	10,000.00	10,000		
170	Staging to exterior wall	22,946	sf	3.00	68,838		
171	SUBTOTAL					1,013,860	
172							
173	B2020 WINDOWS	9,178	sf				
174	Curtainwall; 25% of glazed area	2,294	sf	110.00	252,340		
175	Premium for sunscreen and light shelf elements	1	ls	50,000.00	50,000		
176	Windows/storefront; 75% of glazed area	6,884	sf	85.00	585,140		
177	Louvers (allowance)	250	sf	60.00	15,000		
178	Backer rod & double sealant	3,029	lf	9.00	27,261		
179	Wood blocking at openings	3,029	lf	4.00	12,116		
180	SUBTOTAL					941,857	
181							
182	B2030 EXTERIOR DOORS						
183	Glazed entrance doors including frame and hardware; double door	2	pr	8,000.00	16,000		
184	HM doors, frames and hardware- Double	3	pr	3,600.00	10,800		
185	HM doors, frames and hardware- Single	1	ea	1,800.00	1,800		
186	Backer rod & double sealant	117	lf	9.00	1,053		
187	Wood blocking at openings	117	lf	4.00	468		
188	SUBTOTAL					30,121	
189							
190	TOTAL - EXTERIOR CLOSURE						\$1,985,838

B30 ROOFING

B3010 ROOF COVERINGS

Flat roofing

197	PVC roof membrane fully adhered	18,240	sf	7.50	136,800		
198	Insulation	18,240	sf	6.00	109,440		
199	1/2" dens-deck protection board	18,240	sf	2.00	36,480		
200	Reinforced vapor barrier	18,240	sf	1.00	18,240		
201	Rough blocking	2,976	lf	6.00	17,856		
202	Miscellaneous Roofing						
203	Metal panels to underside of bridge connector	672	sf	86.00	57,792		
204	Roof screens - allow	1,100	sf	50.00	55,000		
205	Roof fascia/cornice	744	lf	90.00	66,960		
206	Roof ladders	1	ls	3,000.00	3,000		
207	Walk pads	1	ls	10,000.00	10,000		
208	SUBTOTAL					511,568	
209							
210	B3020 ROOF OPENINGS						
211	Skylights, allow				NIC		
212	Roof hatch	1	loc	2,500.00	2,500		
213	SUBTOTAL					2,500	

TOTAL - ROOFING

\$514,068

C10 INTERIOR CONSTRUCTION

C1010 PARTITIONS



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ADDITION							
221	Reinforced masonry shear walls at elevator	1,764	sf	25.00	44,100		
222	Stairs; 2 HR rated	3,948	sf	16.00	63,168		
223	Corridors; GWB with 2 lyrs corridor side	13,216	sf	15.55	205,509		
224	Demising; Metal stud w/ 2 layers gwb	8,988	sf	17.35	155,942		
225	Partitions at Admin spaces, back of house etc.	1,554	sf	15.85	24,631		
226	Plumbing walls	1,316	sf	16.00	21,056		
227	Sealants & caulking at partitions	29,470	sf	0.50	14,735		
228	Rough blocking to partitions	2,267	lf	3.00	6,801		
229	Operable partitions	1,056	sf	75.00	79,200		
230	Glazed partitions/borrowed lights - allowance	1	ls	50,000.00	50,000		
231	Miscellaneous GWB	39,580	gsf	5.00	197,900		
232	SUBTOTAL					863,042	
233							
234	C1020 INTERIOR DOORS						
235	Allowance for specialty doors, doors and hardware	39,580	gsf	5.00	197,900		
236	SUBTOTAL					197,900	
237							
238	C1030 SPECIALTIES / MILLWORK						
239	Toilet Partitions and accessories	39,580	gsf	1.25	49,475		
240	Backer panels in electrical closets	1	ls	1,000.00	1,000		
241	Marker boards/tackboards in classrooms, offices, conference rooms, library and MP rooms; 20' tackboard w/ 8' markerboard in each Educational space	39,580	sf	1.00	39,580		
242	Building directory	1	loc	3,000.00	3,000		
243	Bronze dedication plaque	1	loc	2,500.00	2,500		
244	Room Signs	39,580	gsf	0.40	15,832		
245	Fire extinguisher cabinets	13	ea	350.00	4,550		
246	Lockers	39,580	gsf	1.00	39,580		
247	Janitors Closet Accessories	1	ls	1,000.00	1,000		
248	Shelving in storage rooms	1	ls	10,000.00	10,000		
249	Expansion joints	1	ls	7,000.00	7,000		
250	Miscellaneous metals throughout building	39,580	sf	1.25	49,475		
251	Miscellaneous sealants throughout building	39,580	sf	1.00	39,580		
252	SUBTOTAL					262,572	
253							
254	TOTAL - INTERIOR CONSTRUCTION						\$1,323,514
255							
256							
257	C20 STAIRCASES						
258							
259	C2010 STAIR CONSTRUCTION						
260	Metal pan stair; egress stair	4	flt	30,000.00	120,000		
261	Concrete fill to stairs	4	flt	2,000.00	8,000		
262	SUBTOTAL					128,000	
263							
264	C2020 STAIR FINISHES						
265	High performance coating to stairs including all railings etc.	4	flt	3,000.00	12,000		
266	Rubber tile at stairs - landings	600	sf	12.00	7,200		
267	Rubber tile at stairs - treads & risers	460	lft	22.00	10,120		
268	SUBTOTAL					29,320	
269							
270	TOTAL - STAIRCASES						\$157,320
271							
272							
273	C30 INTERIOR FINISHES						
274							
275	C3010 WALL FINISHES						



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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADDITION							
276	Allowance for wall finishes	39,580	gsf	6.00	237,480		
277	SUBTOTAL					237,480	
278							
279	C3020 FLOOR FINISHES						
280	Allowance for floor finishes	39,580	gsf	8.00	316,640		
281	SUBTOTAL					316,640	
282							
283	C3030 CEILING FINISHES						
284	Allowance for ceiling finishes/insulation underneath parking area	15,140	sf	8.00	121,120		
285	Allowance for ceiling finishes	39,580	sf	7.00	277,060		
286	SUBTOTAL					398,180	
287							
288	TOTAL - INTERIOR FINISHES						\$952,300
289							
290							
291	D10 CONVEYING SYSTEMS						
292							
293	D1010 ELEVATOR						
294	New elevator; 3 stop	1	ea	120,000.00	120,000		
295	SUBTOTAL					120,000	
296							
297	TOTAL - CONVEYING SYSTEMS						\$120,000
298							
299							
300	D20 PLUMBING						
301							
302	D20 PLUMBING, GENERALLY						
303	Plumbing; complete system	39,580	gsf	14.00	554,120		
304	SUBTOTAL					554,120	
305							
306	TOTAL - PLUMBING						\$554,120
307							
308							
309	D30 HVAC						
310							
311	D30 HVAC, GENERALLY						
312	HVAC complete system	39,580	gsf	36.00	1,424,880		
313	SUBTOTAL					1,424,880	
314							
315	TOTAL - HVAC						\$1,424,880
316							
317							
318	D40 FIRE PROTECTION						
319							
320	D40 FIRE PROTECTION, GENERALLY						
321	Sprinkler system at parking area; dry system	15,140	gsf	5.00	75,700		
322	Sprinkler system	39,580	gsf	4.50	178,110		
323	SUBTOTAL					253,810	
324							
325	TOTAL - FIRE PROTECTION						\$253,810
326							
327							
328	D50 ELECTRICAL						
329							
330	D5010 COMPLETE ELECTRICAL SYSTEM						
331	Lighting and FA at parking area	15,140	gsf	12.00	181,680		
332	Electrical system; complete	39,580	gsf	30.00	1,187,400		
333	SUBTOTAL					1,369,080	
334							
335							
336	TOTAL - ELECTRICAL						\$1,369,080
337							
338							
339	E10 EQUIPMENT						
340							



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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADDITION							
E10	EQUIPMENT, GENERALLY						
	AV Equipment (including Smartboards, Projectors, LED monitors, Digital information displays etc.)					FF+E	
	SUBTOTAL					-	
TOTAL - EQUIPMENT							
E20	FURNISHINGS						
E2010	FIXED FURNISHINGS						
	Entry mats & frames - recessed with carpet/rubber strips	500	sf	45.00	22,500		
	Manual operated roller shades	6,884	sf	6.00	41,304		
	Counters, base cabinets, tall storage in classrooms and other rooms	39,580	gsf	7.00	277,060		
	SUBTOTAL					340,864	
E2020	MOVABLE FURNISHINGS						
	All movable furnishings to be provided and installed by owner						
	SUBTOTAL					NIC	
TOTAL - FURNISHINGS							
							\$340,864
F10	SPECIAL CONSTRUCTION						
F10	SPECIAL CONSTRUCTION						
	No Work in this section						
	SUBTOTAL						
TOTAL - SPECIAL CONSTRUCTION							
F20	SELECTIVE BUILDING DEMOLITION						
F2010	BUILDING ELEMENTS DEMOLITION						
	Create openings to existing façade for new connections	2	loc	10,000.00	20,000		
	SUBTOTAL					20,000	
F2020	HAZARDOUS COMPONENTS ABATEMENT						
	None Included						
	SUBTOTAL						
TOTAL - SELECTIVE BUILDING DEMOLITION							
							\$20,000



Schematic Design Estimate

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK							
G	SITEWORK						
G10	SITE PREPARATION & DEMOLITION						
	Site construction fence/barricades	700	lf	14.00	9,800		
	Remove existing paving	9,000	sf	1.50	13,500		
	Remove existing retaining walls	1	ls	10,000.00	10,000		
	Miscellaneous demolition	1	ls	25,000	25,000		
	<u>Site Earthwork</u>						
	Allowance to alter grading at main entrance	1	ls	50,000.00	50,000		
	Reduce existing grade by 4ft	3,111	cy	40.00	124,440		
	Silt fence/erosion control, wash bays, stock piles	700	lf	15.00	10,500		
	Construction entrance	1	ls	10,000.00	10,000		
	SUBTOTAL					253,240	
G20	SITE IMPROVEMENTS						
	<u>Asphalt Paving</u>	18,440					
	gravel base; 12" thick	683	cy	35.00	23,905		
	asphalt; 4" thick	2,049	sy	26.00	53,274		
	VGC	770	lf	32.00	24,640		
	Add for accessible parking spots	1	ls	10,000.00	10,000		
	Enlarge exterior concrete landings	4	loc	5,000.00	20,000		
	New concrete paving	900	sf	10.00	9,000		
	New retaining walls	320	lf	280.00	89,600		
	<u>Landscaping</u>						
	Miscellaneous landscape repairs/upgrades	1	ls	30,000.00	30,000		
	SUBTOTAL					260,419	
G30	CIVIL MECHANICAL UTILITIES						
	<u>Water supply</u>						
	New DI piping; 6"	150	lf	100.00	15,000		
	FD connection	1	loc	2,000.00	2,000		
	Gate valves	2	loc	750.00	1,500		
	Connect to existing line (Wet Taps)	1	loc	10,000.00	10,000		
	<u>Storm water</u>						
	Allowance miscellaneous stormwater improvements	1	ls	40,000.00	40,000		
	SUBTOTAL					\$68,500	
G40	ELECTRICAL UTILITIES						
	<u>Power</u>						
	Manhole, new	1	ea	9,000.00	9,000		
	Primary ductbank						
	Ductbank AA 2-4" PVC conduits	150	lf	60.00	9,000		
	Primary cabling	150	lf		Utility company		
	Pad mounted transformer	1	ea		Utility company		
	Transformer pad	1	ea	2,500.00	2,500		
	<u>Communications</u>						
	Manhole, new	1	ea	9,000.00	9,000		
	Communications ductbank CC						
	4-4" PVC conduits	150	lf	100.00	15,000		
	Cabling	150	lf		Utility company		
	<u>Site Lighting</u>						
	Lighting allowance	1	ls	20,000.00	20,000		
	SUBTOTAL					64,500	
TOTAL - SITE DEVELOPMENT							\$646,659